Monday

Statistics
Probability Unit Test Review

Name: KEY
Date: _____

1) Define **mutually exclusive** in your own words.

Two events cannot occur at the same time

2) Which events are **mutually exclusive**?
   a. Rolling an odd number on a die and rolling a 5 on a die
   b. Rolling a 3 on a die and rolling an even number on a die
   c. Graduating from high school and being accepted into college
   d. Graduating from high school and playing an instrument

3) State two events that are **mutually exclusive**.

4) Define **independent** in your own words.

One event does not affect the other event

5) Which events are probably **independent**?
   a. Graduating from high school and being accepted into college
   b. Getting an odd number and a 5 on one roll of a die
   c. Drawing a red M&M candy from a package and then drawing a green M&M
   d. Winning a swim meet and winning the lottery

6) State two events that are **independent**.

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7) Label each pair of events as **mutually exclusive**, **independent**, or **dependent**, then **justify** you choice.

a. A traffic light is red. At the same time, there is a car at this intersection with its headlights on.
independent

Justify:

b. A traffic light is green. At the same time, the traffic light for cross traffic is also green.
mutually exclusive

Justify: (3pts)

c. A traffic light is red. At the same time, there is a car stopped at the intersection.
dependent

Justify: (3pts)

8) 57% of the senior class is female. Of the females, 14% are school athletes. What percent of seniors are female athletes?

a. 8%
b. 41%
c. 69%
d. not possible; gender and athletic status are mutually exclusive events

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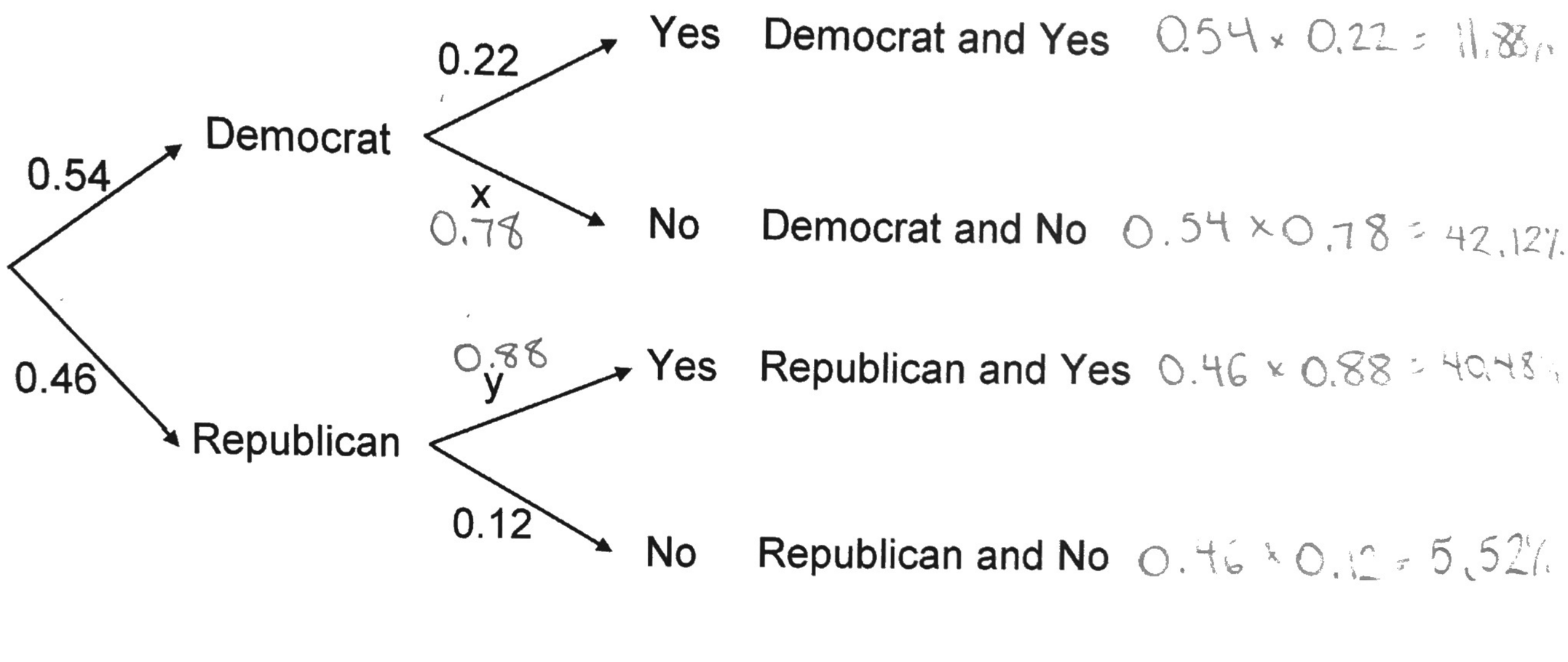
9) Here is a partially finished tree diagram showing the political parties of local government officials and how they are expected to vote on a upcoming issue.

Complete the tree diagram with all of the labels and probabilities.



Which probability is represented by **x** on the diagram?

a. The probability of all "no" votes
b. The probability that a Democrat votes "no"
c. The probability that the person is a Democrat
d. The probability that that the person did not vote.

10) Using the diagram in question 4, find these probabilities:

a. *x* 0.78

b. *y* 0.88

c. P(No) .4212 + .0552 = .4764

d. P(No **and** Republican) .0552

e. P(No **or** Republican) .4212 + .4048 + .0552 = 0.8812

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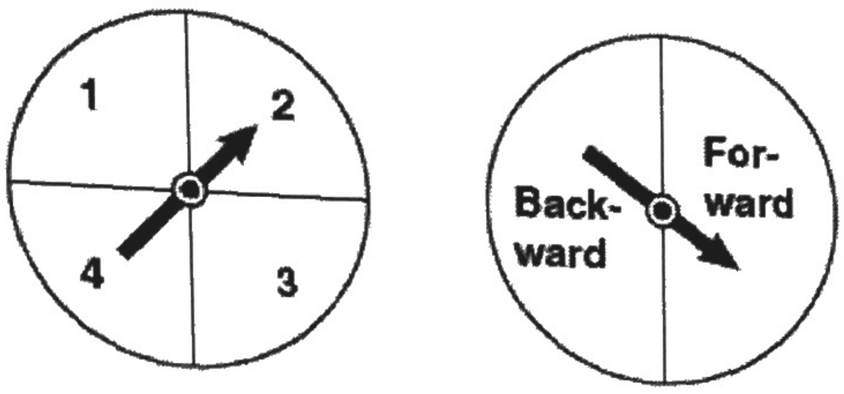
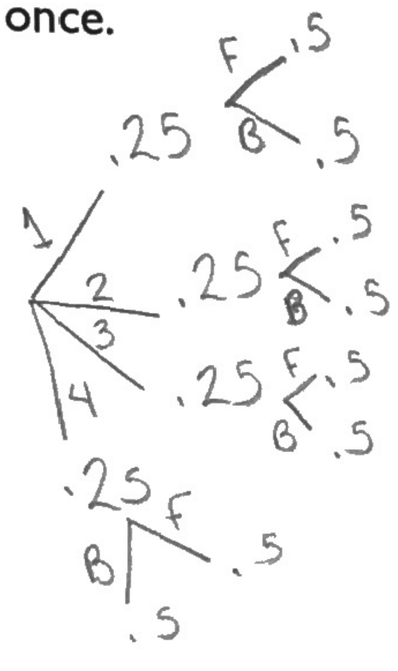
11) Kiara is using the two spinners shown below to play her new board game. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She spins the arrow on each spinner once. Brianna uses the first spinner to determine how many spaces to move. She uses the second spinner to determine whether her move from the first spinner will be forward or backward.



a. Draw a fully labeled tree diagram to show the possible outcomes from spinning each spinner once.



1F = .25 x .5 = .125
1B = .25 x .5 = .125
2F = .25 x .5 = .125
2B = .25 x .5 = .125
3F = .25 x .5 = .125
3B = .25 x .5 = .125
4F = .25 x .5 = .125
4B = .25 x .5 = .125

b. What is the probability that Kiara spins 3 spaces backward?

.125

c. What is the probability that Kiara moves forward?

.5

d. Kiara needs to move at least 2 spaces forward to get ahead of her opponent. What is the probability that this will happen on her next spin?

2F + 3F + 4F
.125 + .125 + .125
.375

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12) An experiment tested a tree fertilizer on a large number of elm and oak trees to see whether it promoted positive changes such as growth, healthier leaves, or increased foliage (leaves). Below is a summary of the data collected in the experiment.

Type	Positive	Negative	Total
Oak	73	45	**118**
Elm	102	27	**129**
Total	**175**	**72**	**247**

a. What is the probability that a tree has a positive change?

$\frac{175}{247} = .71$

b. What is the probability that an oak tree has a positive change?

$\frac{73}{118} = .62$

c. What would it mean for the effect of this fertilizer to be **independent** of tree type?

Fertilizer does not affect the change in the tree.

d. Do the data suggest effect (positive/negative) and tree type are **independent**? Explain.

$\frac{\text{positive oak tree}}{\text{oak tree}}$ $\frac{73}{118} = .62$

$\frac{\text{positive}}{\text{total}}$ $\frac{175}{247} = .71$

Effect and tree type are dependent. A smaller percent of oak trees than overall trees show a positive effect.

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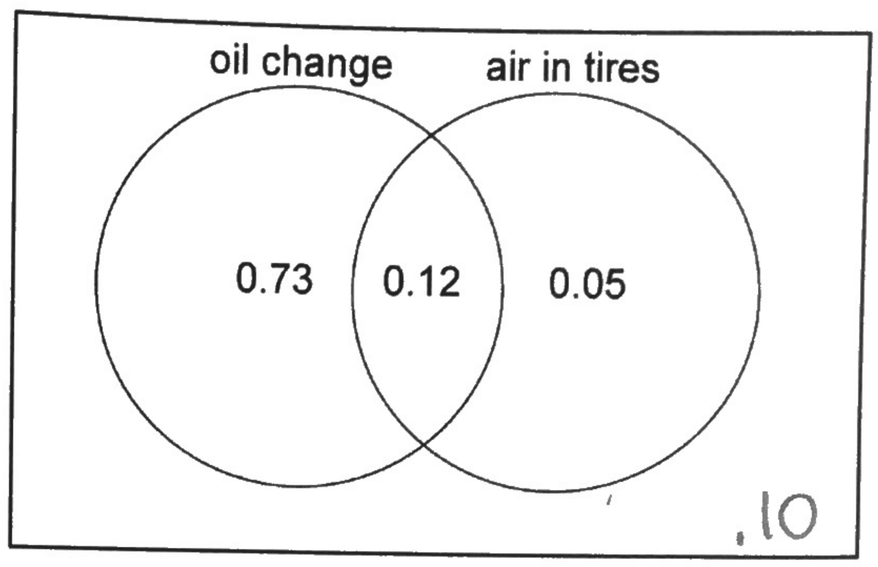
13) The Venn diagram at right shows the percentages of cars at Sam's Garage that need an oil change or air in the tires. **Show your work.**



a. What is the probability that a car needs air in its tires?

0.12 + 0.05 = 0.17

b. What is the probability that a car needs an oil change **or** air?

.73 + .12 + .05 = .90

c. What is the probability that a car needs an oil change **and** air?

0.12

d. What is the probability that a car needs **neither** an oil change nor air?

0.10

e. Are needing an oil change and needing air **mutually exclusive** events?

Explain why or why not.

They are not mutually exclusive. You can have both jobs done.

14) The table shows the plans of a group of high school seniors. **Show your work.**

		Post Graduation Plans			
		work	**college**	**military**	**other**
Sex	**Male**	0.09	0.29	0.11	0.04
	Female	0.05	0.35	0.05	0.02

a. What is the probability that a senior plans to join the military?

.11 + .05 = .16

b. What is the probability that a senior plans to join the military **given that the** student is female?

$\frac{.05}{.47} = 10.6\%$.

c. What is the probability that a senior is female **given that** the senior plans to join the military?

$\frac{.05}{.16} = 31.25\%$.

d. Explain what it would mean if the sex and post-graduate plans of seniors are **independent.**

Post-college plans would not depend on someone's sex.

e. Based on the table, does it appear that a senior's post-graduation plans are **independent** of the person's sex?
Justify your answer.

Post-graduation plans & sex are not independent. A lower percent of females than overall seniors plan to join the military.

female military / female: $\frac{.05}{.47}$ 10.6%

military / total: $\frac{.16}{1.00} = 16\%$.